(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 533 432 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92308382.8**

(22) Date of filing : **15.09.92**

(51) Int. Cl.[5] : **A61M 1/00**, A61B 17/32

(30) Priority : **17.09.91 JP 236565/91**

(43) Date of publication of application :
24.03.93 Bulletin 93/12

(84) Designated Contracting States :
BE DE FR GB IT NL SE

(71) Applicant : **Yamauchi, Teiyu**
Honjo-City House 701, 16-13,
Higashi-Komagata 3-chome
Sumida-ku, Tokyo (JP)

(71) Applicant : **Furui, Shigeru**
2-308, 2, Namiki 3-chome
Tokorozawa-shi, Saitama (JP)

(71) Applicant : **KABUSHIKI KAISHA CLINICAL SUPPLY**
3, Takehaya-cho, Kawashima-machi
Hashima-gun, Gifu (JP)

(72) Inventor : **Yamauchi, Teiyu, Honjo-City House 701**
16-13, Higahi-Komagata 3-Chome, Sumida-ku
Tokyo (JP)
Inventor : **Furui, Shigeru**
2-308, 2, Namiki 3-chome
Tokorozawa-shi, Saitama (JP)

(74) Representative : **BATCHELLOR, KIRK & CO.**
2 Pear Tree Court Farringdon Road
London EC1R 0DS (GB)

(54) Catheter device.

(57) A catheter device 11 for removal of physiological substances such as a thrombus, a hematoma, pus, or phlegm creates suction by directing a forced flow of a pressurized fluid toward a discharge port 10 of a catheter tube 11. A suction port 12 at or near a front end draws the physiological substances into the catheter tube. The forced flow of fluid tends to break up and dilute the physiological substances to ease their discharge through the discharge port. Embodiments are disclosed in which the fluid flow is created by a U-shaped fluid supply tube 21 having an injection port 22 directed toward the discharge port. The U-shaped tube may be fully inside the catheter tube, or only its end may be inserted into the catheter tube. In a further embodiment, the fluid supply tube discharges the fluid toward the suction port, and into a cup-shaped shield. Liquid or gas is injected into the catheter tube near the suction port and toward the discharge aperture to create a suction force at the suction port 12.

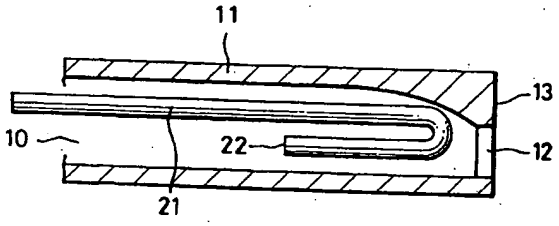

FIG. 5

0 533 432 A1

through the suction port by ejecting action of the injected fluid. Although the physiological substance, such as the thrombus, hematoma, pus, or phlegm, may be viscous, the force of the injected fluid breaks it up and discharges it through the discharge port at base end aperture 10 of catheter tube 11.

It necessary, a pump may be used at base end aperture 10 of catheter 11 to create or improve the suction effect.

Referring to Fig. 2, in another embodiment of the present invention, the front end of catheter tube 11 is open, thereby serving as suction port 12 in this second embodiment. This arrangement contrasts with the first embodiment, where suction port 12 is at or near the front end of catheter tube 11. The configuration and operation of this second embodiment is otherwise the same as the first.

Referring to Fig. 3, in another embodiment of the present invention, fluid supply tube 21 is not completely inserted into catheter tube 11 but placed alongside catheter tube 11 so that the front end of fluid supply tube 21 is bent into a U-shape and inserted through suction port 12 into the open end of catheter tube 11. Fluid injection port 22 is close to suction port 12 and open toward the discharge end. The configuration and operation of this third embodiment is otherwise the same as the first.

Referring to Fig. 4, in yet another embodiment of the present invention, fluid supply tube 21 is not fully inserted into catheter tube 11 but placed alongside catheter tube 11 so that the front end of fluid supply tube 21 is bent into a U-shape and inserted into catheter tube 11 through a closed front end 13 of catheter tube 11. A suction tube 14, a front end of which serves as suction port 12, is also inserted into closed front end 13 of catheter tube 11. The configuration and operation of this fourth embodiment is otherwise the same as the first.

Referring to Fig. 5, yet another embodiment of the present invention is configured similarly to the embodiment of Fig. 2, except the front end of catheter tube 11 is partially closed to form suction port 12, which becomes wider further inside catheter tube 11, thereby permitting a smoother suction effect.

Referring to Fig. 6, in still another embodiment a shield 15 in the shape of a cylinder closed at its bottom end is fixed inside catheter tube 11 in close proximity to suction port 12. Shield 15 is positioned so that its bottom end faces suction port 12. Fluid supply tube 21 is inserted in catheter tube 11 with its fluid injection port 22 open and facing the said bottom end of shield 15. Fluid is injected from fluid injection port 22 of fluid supply tube 21 toward shield 15. Injected fluid rebounds from shield 15 back toward the discharge end of catheter tube 11. Thus shield 15 serves as the injection port for the fluid, thereby producing the suction action.

A catheter device according to the present invention can remove by suction such viscous and potentially blocking physiological substances as thrombi, hematomas, pus, and phlegm by inserting a suction port of a catheter tube, into the vicinity of a thrombus or a hematoma (for example) at an affected part or a part clogged by pus or phlegm, and injecting, in the vicinity of the discharge end of the suction port, liquid or gas from an injection port of a fluid supply tube in the direction of the discharge side, thereby causing a suction action. Therefore the device is capable, through a simple structure, of removing viscous physiological fluid rapidly and reliably.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.

Claims

1. A catheter device comprising:
   a catheter tube;
   a suction port in said catheter tube;
   a discharge port in said catheter tube;
   means for injecting a pressurized fluid into said catheter tube; and
   said means for injecting including means for directing a flow of said pressurized fluid toward said discharge port, whereby a suction is created in said suction port.

2. A catheter device as claimed in claim 1, wherein:
   said means for injecting includes a fluid supply tube;
   said fluid supply tube having at least an end portion in said catheter tube;
   said end portion being directed toward said discharge port to create said suction.

3. A catheter device comprising:
   a catheter tube having a front end and an aperture at a base end;
   a suction port in said catheter tube;
   said suction port being open near said front end;
   said aperture effective as a discharge port;
   a fluid supply tube;
   said fluid supply tube including at least a front end inserted into said catheter tube;
   said fluid supply tube having a fluid injection port in proximity to said suction port;
   said fluid injection port being open toward said discharge port; and

said fluid supply tube being effective, when fluid flows forcibly therethrough, for creating suction in said suction port and for ejecting said fluid, together with physiological substances sucked through said suction port, through said discharge port.

4. A catheter device as claimed in any preceding claim, wherein:
said front end of said catheter tube is closed.

5. A catheter device as claimed in any one of claims 1 to 3, wherein:
said front end of said catheter tube is open or only partially closed to form said suction port.

6. A catheter device as claimed in any preceding claim, wherein:
only said front end of said fluid supply tube is inserted into said catheter tube.

7. A catheter device as claimed in any preceding claim other than claim 5, wherein:
said suction port of said catheter tube is a separate tube passing into said catheter.

8. A catheter device as claimed in any one of claims 1 to 6, wherein:
said suction port of said catheter tube is substantially tapered.

9. A catheter device as claimed in any preceding claim, wherein said means for directing a flow includes:
a fluid supply tube directing a flow of said pressurized fluid away from said discharge port;
a cup-shaped shield into which said flow is directed; and
said cup-shaped shield being effective for redirecting said flow toward said discharge port.

10. A catheter device, which comprises:
a catheter tube having a front end and a base end;
said catheter tube having a suction port;
said suction port being open in proximity to said front end;
a discharge port at said base end;
a fluid supply tube at least partially inserted into said catheter tube;
said fluid supply tube having a fluid injection port in proximity to said suction port;
a shield having a closed end in proximity to said suction port and an open end substantially enclosing said fluid injection port; and
said shield being effective for deflecting a fluid discharged from said fluid injection port, to enable a suction to be created in said suction port when a fluid is forced into said fluid supply tube and injected through said fluid injection port, to enable removal of a physiological substance by suction and discharge thereof through said discharge port.

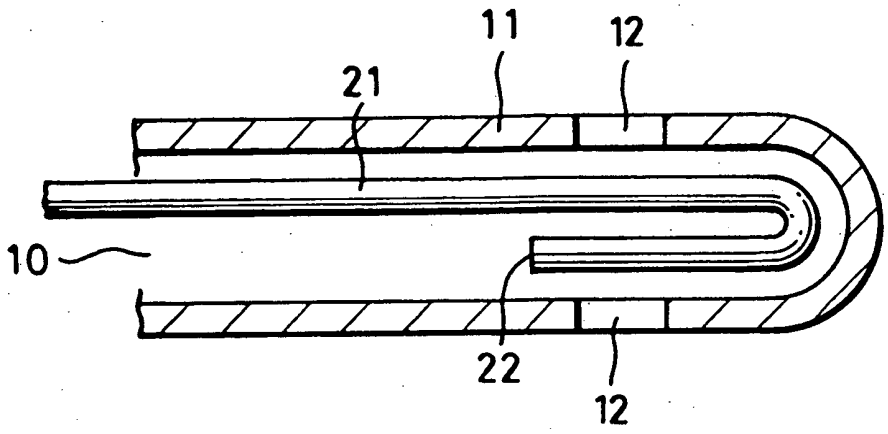

FIG. 1

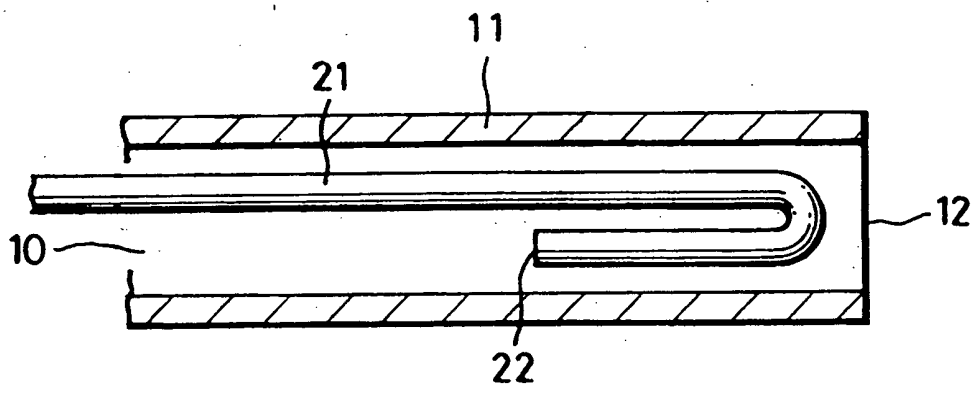

FIG. 2

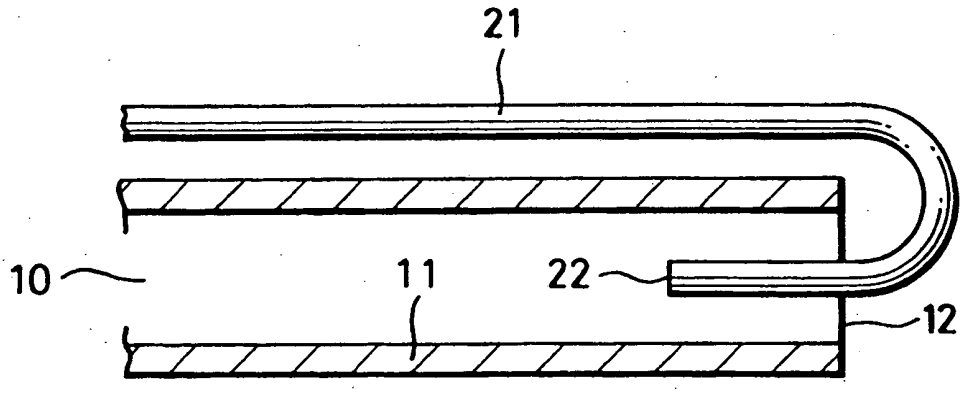

FIG. 3

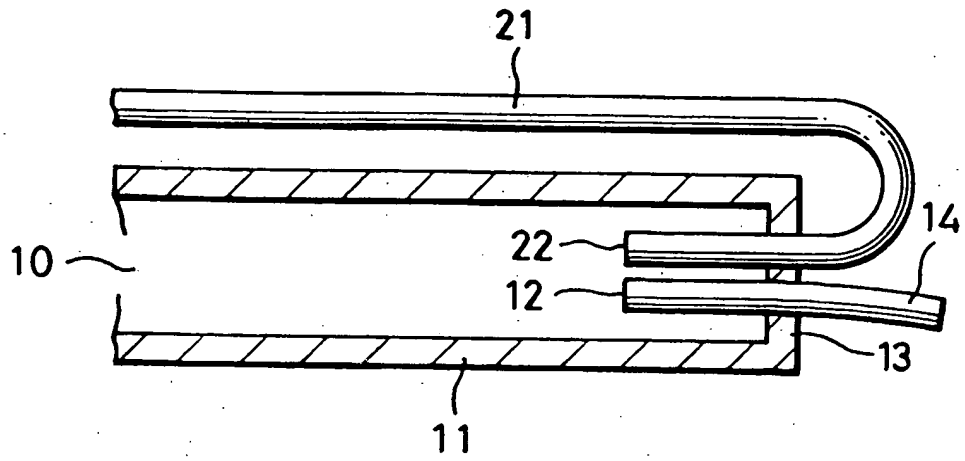

FIG. 4

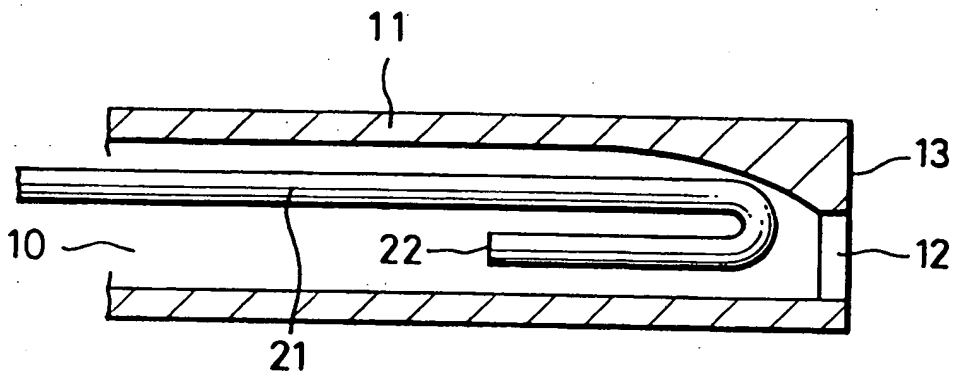

FIG. 5

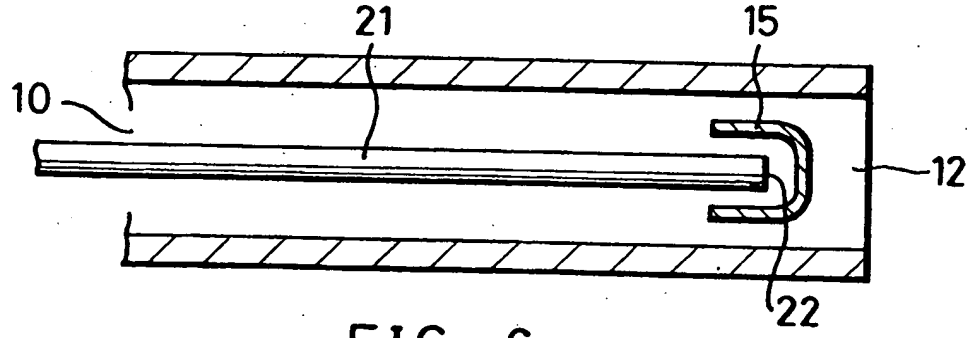

FIG. 6

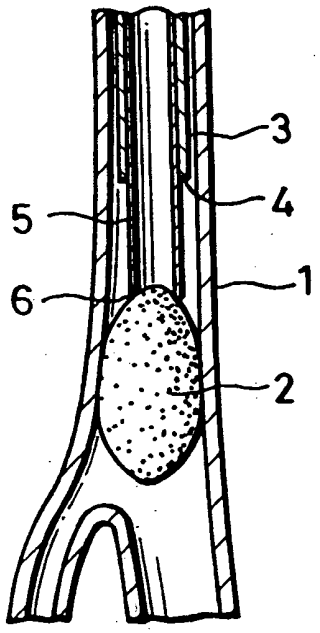

FIG. 7
(PRIOR ART)

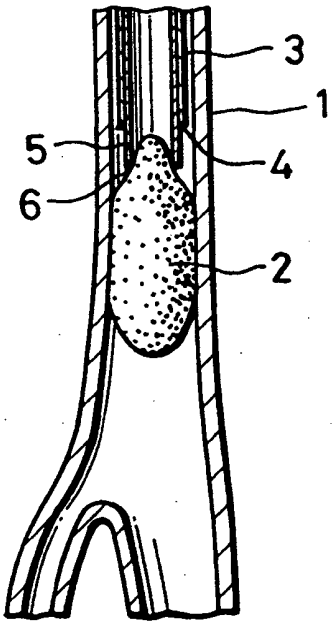

FIG. 8
(PRIOR ART)

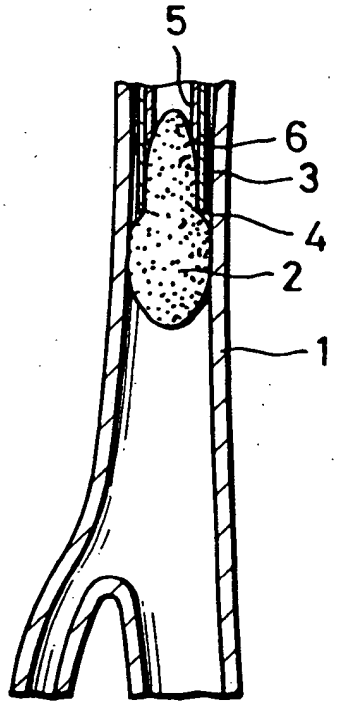

FIG. 9
(PRIOR ART)

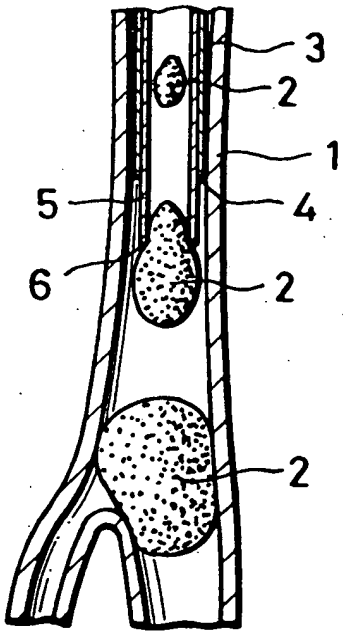

FIG. 10
(PRIOR ART)

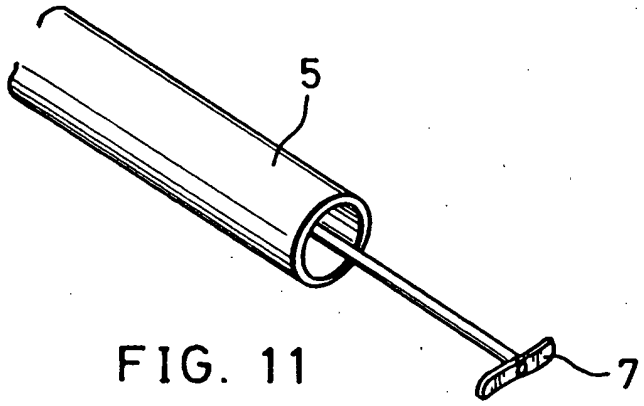

FIG. 11
(PRIOR ART)

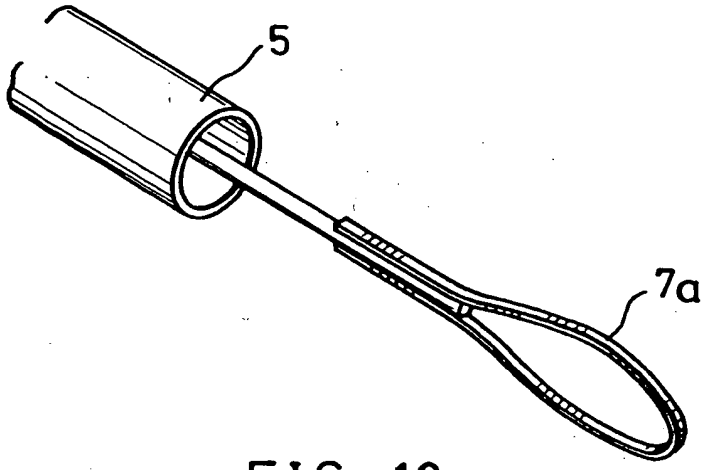

FIG. 12
(PRIOR ART)

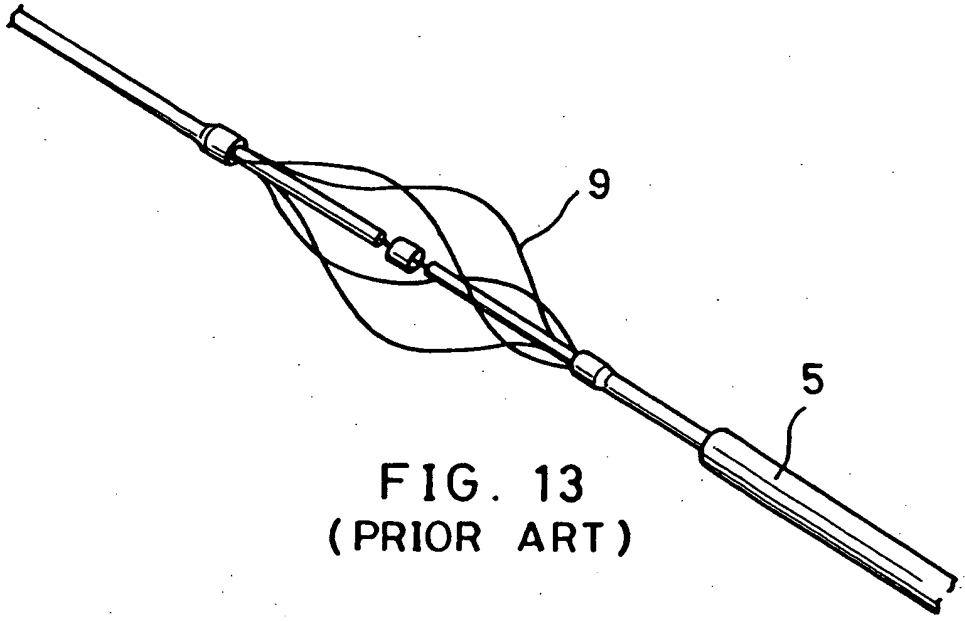

FIG. 13
(PRIOR ART)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 30 8382

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	WO-A-9 005 493 (SVEDMAN) * the whole document *	1-6	A61M1/00 A61B17/32
X	EP-A-0 442 579 (CORDIS) * column 4, line 3 - line 29; figure 7 *	1-4	
X A	US-A-4 715 848 (BEROZA) * column 3, line 1 - column 4, line 2; figures 1,2 *	1-4 9,10	
A	EP-A-0 175 096 (VELTRUP) * abstract; figure 2 *	1-3,5	
A	US-A-4 382 442 (JONES) * column 4, line 9 - line 31; figures 1,4,5 *	9,10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A61M
A61B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 DECEMBER 1992	KOUSOURETAS I.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)